

What is claimed is:

1. A rubidium-82 generator, comprising:
 - (a) a strontium-82 support medium comprising sodium nonatitanate.
2. The rubidium-82 generator of claim 1, wherein the sodium nonatitanate is characterized by a strontium selectivity greater than 250,000 mL/g at an alkaline pH.
3. The rubidium-82 generator of claim 1, wherein the sodium nonatitanate is characterized by a rubidium selectivity less than 100 mL/g at an alkaline pH.
4. The rubidium-82 generator of claim 1, wherein the sodium nonatitanate is characterized by a strontium/rubidium separation factor greater than 1,000.
5. The rubidium-82 generator of claim 1, wherein the sodium nonatitanate is characterized by a strontium/rubidium separation factor greater than 100,000.
6. A process for preparing a rubidium-82 generator, comprising:
 - (a) preparing sodium nonatitanate from titanium isopropoxide and aqueous sodium hydroxide;
 - (b) heating the sodium nonatitanate at a temperature between 100°C and 250°C for a period between 12 hours and 2 weeks; and
 - (c) absorbing strontium-82 on the sodium nonatitanate from an aqueous solution comprising strontium-82 and sodium chloride, wherein the sodium chloride concentration is between 0.1 and 1 molar.
7. The process of claim 6, wherein the molar ratio of aqueous sodium hydroxide to titanium isopropoxide is in excess of 0.44.
8. The process of claim 6, wherein the molar ratio of aqueous sodium hydroxide to titanium isopropoxide is between 2 and 6.

9. A method of chemically isolating strontium-82 from a proton-irradiated molybdenum target, comprising:

- (a) dissolving the molybdenum metal target containing the strontium-82;
- (b) adjusting the pH of the dissolved molybdenum target solution to an alkaline pH;
- (c) removing precipitates from the solution; and then
- (d) absorbing the strontium-82 from the solution onto a support comprising sodium nonatitanate.

10. A process for preparing a solution containing rubidium-82, comprising:

- (a) providing a solution containing strontium-82 at a pH between 10 and 14;
- (b) absorbing strontium-82 onto a sodium nonatitanate support medium; and
- (c) eluting rubidium-82 from the sodium nonatitanate support medium with a solvent.

11. The process of claim 10, wherein the solvent is selected from the group consisting of water and saline solutions.

12. The process of claim 10, wherein the solvent is an aqueous solution having a sodium chloride concentration between 0.001 molar and 1 molar.

13. The process of claim 10, wherein the solvent is an aqueous solution having a sodium chloride concentration between 0.2 molar and 1 molar.

14. The process of claim 10, wherein the solvent is a pharmaceutical-grade saline and buffer solution.

15. A method of chemically isolating strontium-82 from a proton-irradiated rubidium or rubidium chloride target, comprising:

- (a) dissolving the target containing the strontium-82;
- (b) adjusting the pH of the dissolved target solution to an alkaline pH;
- (c) removing precipitates from the solution; and then
- (d) absorbing the strontium-82 from the solution onto a support comprising sodium nonatitanate without absorbing rubidium.